Energy Consumption by End-Use Sector

In the IEO2005 projections, end-use energy consumption in the residential, commercial, industrial, and transportation sectors varies widely among regions and from country to country.

One way of looking at the future of world energy markets is to consider trends in energy consumption at the end-use sector level. With the exception of the transportation sector, which is almost universally dominated by petroleum products at present, the mix of energy use in the residential, commercial, and industrial sectors can vary widely from country to country, depending on a combination of regional factors, such as the availability of energy resources, the level of economic development, and political, social, and demographic factors. This chapter outlines the *International Energy Outlook 2005* (*IEO2005*) forecast for regional energy consumption by end-use sector.

Residential Sector

The residential sector is defined by the energy consumed in households, excluding transportation uses. The physical size of residential structures is the most important factor in determining the amount of energy used by their occupants. Larger homes require more energy to provide heating, air conditioning, and lighting, and they tend to include more energy-using appliances, such as televisions and laundry equipment. Smaller structures require less energy, because they contain less space to be heated or cooled, produce less heat transfer with the outdoor environment, and have fewer occupants.

The type and amount of energy used by households vary from country to country, depending on income levels, natural resources, and available energy infrastructure. In general, households in the mature market economies use more energy than those in the transitional or emerging economies, in part because they tend to include more energy-using appliances. Consequently, residential sector energy use generally is higher in the mature market economies (Figure 20). In most of the world's countries, residential energy use is expected to increase as households continue to purchase additional electricity-using appliances.

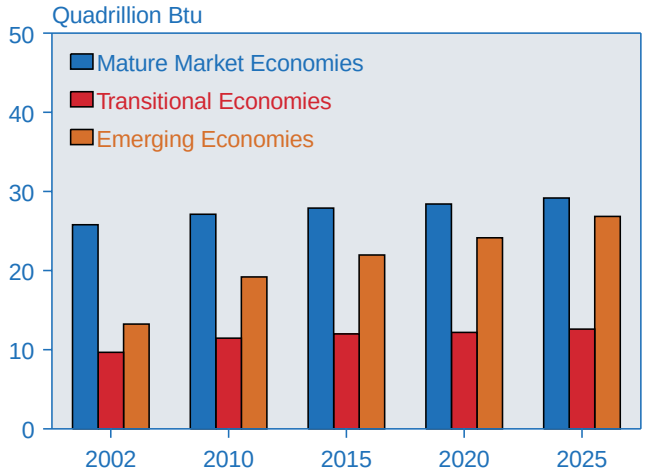
Mature Market Economies

Households in mature market economies use energy more intensively than those in less developed economies, primarily because of higher income levels. In North America, energy use in Mexico's residential sector is expected to nearly double by 2015 (relative to 2002), to 1.1 quadrillion Btu; growth in electricity demand is responsible for most of the projected increase. After 2015, the growth in Mexico's residential delivered energy use is expected to slow, reaching 1.3 quadrillion Btu in 2025. On average, the country's residential energy consumption increases in the forecast by 3.4 percent per year from 2002 to 2025.

In the United States, which is by far the largest residential energy consumer in the region (and in the world), total residential electricity use is projected to grow on average by 1.6 percent per year, to 5.4 quadrillion Btu in 2015 and 6.2 quadrillion Btu in 2025, from 4.3 quadrillion Btu in 2002. Increasing use of electric appliances contributes most to the expected growth in residential electricity demand through 2025.

In Western Europe and mature market Asia, unlike North America, residential delivered energy consumption combined is not projected to increase through 2025, because increases in electricity use are expected to be offset by decreases in fossil fuel use, and because population in both regions combined is projected to increase by less than 1.0 percent from 2002 to 2025. In Western Europe, residential electricity use is expected to grow by

Figure 20. Residential Sector Energy Consumption by Region, 2002-2025



Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **Projections:** EIA, System for the Analysis of Global Energy Markets (2005).

0.4 percent per year through 2025, adding 0.3 quadrillion Btu of consumption, while all other fuel use in the sector declines by 0.7 quadrillion Btu. A similar pattern is projected for mature market Asia but with smaller decreases in fossil fuel use, resulting in essentially no increase in residential delivered energy consumption from 2002 to 2025.

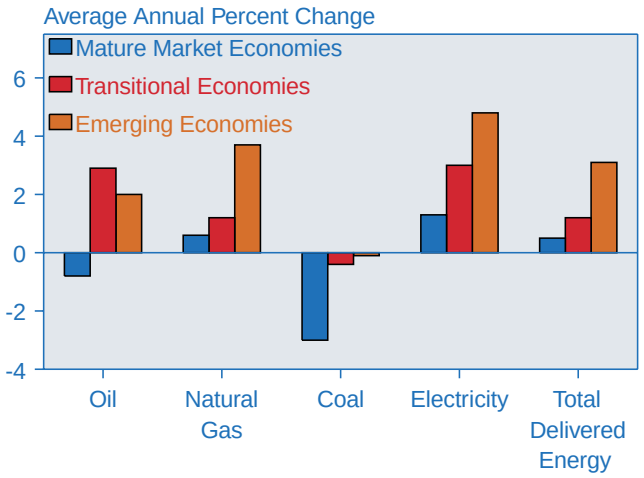
Transitional Economies

As households in Eastern Europe and the former Soviet Union (EE/FSU) transition to market economies, more energy services and energy-using appliances are expected to become available over time. Residential electricity use in the region is projected to nearly double, from 1.4 quadrillion Btu in 2002 to 2.2 quadrillion Btu in 2015 and 2.7 quadrillion Btu in 2025. The transition away from state-run district heating methods allows for increases in natural gas and oil consumption as well. Natural gas consumption in the region's residential sector is projected to grow by an average of 1.5 percent per year from 2002 through 2015 and an average of 1.2 percent per year from 2002 through 2025, as energy service companies increasingly serve homes directly, rather than through district services.

Emerging Economies

Household energy use is projected to increase most rapidly in the coming decades in the nations with emerging economies, relative to other nations (Figure 21). In China and India, population growth and urbanization will create large increases in demand for residential energy services. As a result, the emerging economies in 2025 are projected to nearly equal the mature market economies in residential energy use.

Figure 21. Growth in Residential Sector Delivered Energy Consumption by Region and Fuel, 2002-2025



Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **2025:** EIA, System for the Analysis of Global Energy Markets (2005).

The demand for electricity in China is expected to more than triple by 2025, growing on average by 7.8 percent per year through 2015 and 5.6 percent per year through 2025. More rapid growth in electricity demand is projected for India's residential sector, but electricity consumption and total delivered energy consumption are projected to remain at about one-half those for China through 2025. China and India together accounted for 37 percent of delivered residential energy consumption in the emerging economies in 2002 and are projected to account for more than 43 percent in 2025. The Middle East, Africa, and Central and South America all are projected to see substantial increases in residential energy consumption as well, accounting for 42 percent of the 13.6 quadrillion Btu increase in residential sector delivered energy consumption in the emerging economies through 2025.

Commercial Sector

The commercial sector—often referred to as the services sector or the services and institutional sector—consists of businesses, institutions, and organizations that provide services. The sector encompasses many different types of buildings and a wide range of activities and energy-related services. Examples of commercial sector facilities include schools, stores, correctional institutions, restaurants, hotels, hospitals, museums, office buildings, banks, and even stadiums that hold sporting events. Most commercial energy use occurs in buildings or structures, supplying services such as space heating, water heating, lighting, cooking, and cooling. Energy consumed for services not associated with buildings, such as for traffic lights and city water and sewer services, is also categorized as commercial sector energy use.

Economic and population growth trends drive commercial sector activity and the resulting energy use. The need for services (health, education, financial, government) increases as populations increase. The degree to which these additional needs are met depends in large measure on economic resources—whether from domestic or foreign sources—and economic growth. Economic growth also determines the degree to which additional commercial sector activities are offered and utilized. Higher levels of economic activity and disposable income lead to increased demand for hotels and restaurants to meet business and leisure requirements; for office and retail space to house and service new and expanding businesses; and for cultural and leisure space such as theaters, galleries, and arenas.

Mature Market Economies

With population growth for the mature market economies as a whole expected to continue slowing, the rate of increase in the region's commercial energy demand is also expected to slow. In addition, further efficiency

improvements are expected to moderate energy demand growth over time as energy-using equipment is replaced with newer, more efficient stock. Conversely, strong economic growth in mature markets is expected to include continued growth in business activity, with its associated energy use, in areas such as retail and wholesale trade and business, financial, and leisure services. The combination of these factors is projected to cause commercial delivered energy consumption in this region to increase by 1.3 percent per year from 2002 to 2025 on average, from 16.8 quadrillion Btu in 2002 to 20.0 quadrillion Btu in 2015 and 22.6 quadrillion Btu in 2025 (Figure 22).

Commercial electricity demand in mature market economies is projected to grow by 1.9 percent per year from 2002 to 2025, with continued advances in technology and the introduction of new electronic appliances and equipment (Figure 23). Electricity delivered to commercial customers in the region, which totaled 7.9 quadrillion Btu in 2002, is projected to reach 10.1 quadrillion Btu in 2015 and 12.1 quadrillion Btu in 2025. Natural gas is expected to continue displacing petroleum products and coal as the preferred heating fuel in the mature market economies, especially in Western Europe and Japan.

Transitional Economies

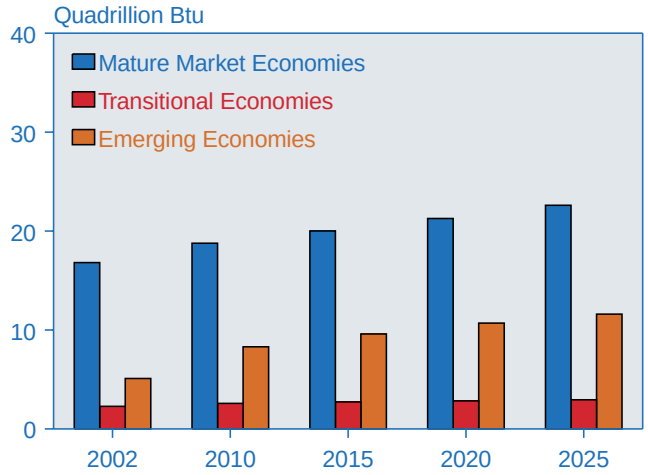
Many of the EE/FSU countries—and the region as a whole—are expected to see their populations decline over the forecast period. Nevertheless, increasing commercial activity and rising incomes are expected to lead to 1.1-percent average annual growth in delivered energy use in the region's commercial sector between 2002 and 2025 (Figure 23). Commercial sector electricity consumption is projected to grow by 2.0 percent per year, to 1.1 quadrillion Btu in 2025, as the transitional nations approach the requirements of market-based economies, including increased adoption of electronic equipment. Commercial sector natural gas use is projected to grow by more than 50 percent, from 0.8 quadrillion Btu in 2002 to 1.2 quadrillion Btu in 2025. Most of the projected increase is attributable to the expectation that natural gas will be used to meet the heating needs of transitional countries to a greater extent than it has in the past, replacing coal and heating oil.

Emerging Economies

Economic growth and commerce are expected to increase rapidly in the emerging economies, fueling additional energy demand in the services sector. Faster population growth is also expected, relative to the growth rates for mature and transitional economies, portending increases in the need for education, health care, and social services and the energy required to provide them. Under these circumstances, commercial delivered energy use in the region is projected to nearly double between 2002 and 2015, to 9.6 quadrillion Btu, and to continue growing to 11.6 quadrillion Btu in 2025, at a 3.6-percent average annual growth rate from 2002 to 2025.

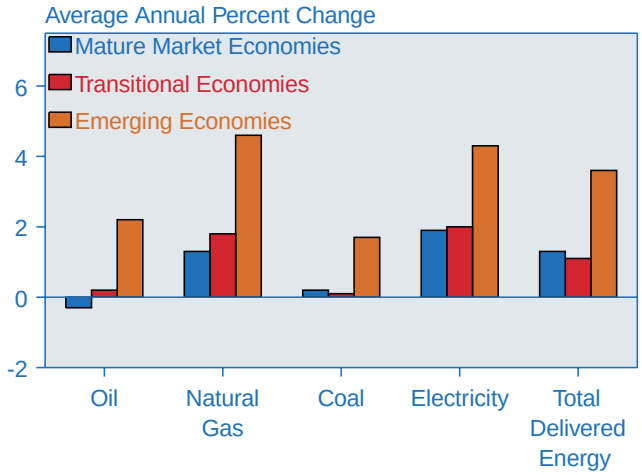
Electricity demand for commercial applications is expected to grow rapidly in emerging economies as more clinics, schools, and businesses gain access to electricity. Annual growth in commercial delivered electricity use is expected to average 4.3 percent through 2025 (Figure 23), with projected consumption of 5.4 quadrillion Btu in

Figure 22. Commercial Sector Energy Consumption by Region, 2002-2025



Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **Projections:** EIA, System for the Analysis of Global Energy Markets (2005).

Figure 23. Growth in Commercial Sector Delivered Energy Consumption by Region and Fuel, 2002-2025



Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **2025:** EIA, System for the Analysis of Global Energy Markets (2005).

2015 and 6.9 quadrillion Btu in 2025. The projected increase in commercial electricity demand is compounded in nations with quickly growing economies, such as China, as they begin to shift away from heavy manufacturing toward services.

Increasing commercial activity is expected to lead to rapid growth in natural gas demand as well. In the forecast, commercial demand for natural gas grows by 5.7 percent per year from 2002 through 2015 and by 4.6 percent per year from 2002 through 2025, as several developing countries focus on expanding the infrastructure necessary for delivery of this relatively clean fuel. Commercial sector oil consumption is expected to increase from 1.6 quadrillion Btu in 2002 to 2.4 quadrillion Btu in 2015 and 2.6 quadrillion Btu in 2025 in the emerging economies, increasing more rapidly in areas where natural gas availability is limited. Although consumption of coal is expected to increase in the forecast, its share of commercial energy use in the emerging economies is projected to decline from 8 percent in 2002 to 5 percent in 2025.

Industrial Sector

Energy is consumed in the industrial sector by a diverse group of industries—including manufacturing, agriculture, mining, and construction—and for a wide range of activities, such as process and assembly uses, space conditioning, and lighting. Overall energy demand in the industrial sector varies across regions and countries of the world, based on the level and mix of economic activity, technological development, and population, among other factors.

Worldwide, energy consumption in the industrial sector is projected to grow by 2.1 percent per year from 2002 to 2025. Industrial energy consumption is expected to increase in all countries and regions; however, industrial sector energy use in the mature market economies (in particular, Japan, the United States, and Western Europe) is expected to grow at a much slower pace—1.0 percent per year—than in the emerging economies (China and other emerging Asia and the Middle East), where industrial sector energy demand is projected to expand by 3.3 percent per year or more (Figure 24).

Mature Market Economies

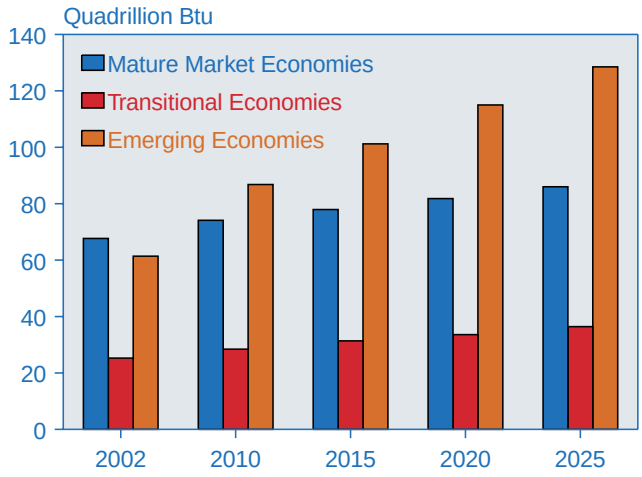
The mature market economies generally have more energy-efficient industrial operations and a mix of industrial output that is more heavily weighted toward non-energy-intensive sectors than do the other country groups. For example, in the United States, the manufacturing share of total industrial output has declined steadily over the past two decades, while the output share for service industries (included in the commercial sector) has increased. Additionally, within the U.S. manufacturing sector, a smaller share of output has been produced by the heavy, energy-intensive industries (such as steelmaking). These general trends are projected to continue.

Similar developments are expected for the other mature market economies, as increasing international trade fosters a shift toward a less energy-intensive mix of industrial activity. For example, many of Japan's heavy industries are reducing their output as demand for energy-intensive materials increasingly is met by imports from China and other Asian countries. In Germany, a decline in industrial energy intensity in the early 1990s was largely the result of closures of heavy industries in the former East Germany after reunification. Much of Germany's inefficient, energy-intensive eastern capacity has already been shut down, but further improvements are projected as capital stock is replaced and modernized.

Transitional Economies

In the EE/FSU countries, industrial sector energy use is projected to grow by 1.6 percent per year over the forecast period, from 25.3 quadrillion Btu in 2002 to 31.4 quadrillion Btu in 2015 and 36.4 quadrillion Btu in 2025 (Figure 24). During the Soviet era, abundant energy resources in the FSU, along with centralized decision-making, led to the construction of energy-inefficient industrial capacity. As the transition to market economies progresses, and as inefficient capacity is replaced with modern facilities, the intensity of energy use in the industrial sector of the transitional EE/FSU economies is projected to decline more rapidly than in rest of the world.

Figure 24. Industrial Sector Energy Consumption by Region, 2002-2025



Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **Projections:** EIA, System for the Analysis of Global Energy Markets (2005).

Russia has the world's largest natural gas reserves. As a result, natural gas is projected to supply 40 percent of the increase in delivered energy use in the industrial sector of the FSU countries. In the transitional EE/FSU economies, only small changes in industrial fuel mix are projected from 2002 to 2025 (Figure 25)—most notably, electricity is projected to claim a growing share of delivered energy use in the FSU, and in the countries of Eastern Europe, natural gas is projected to make up a larger share at the expense of coal.

In 2002, in the aggregate, the transitional economies of the EE/FSU region had a higher ratio of industrial sector energy consumption to regional gross domestic product than did either the mature market or emerging nations. The relatively high ratio is a result of three factors: the transition to market-based economies has been slow; a higher proportion of total output from the region is from the industrial sector than in the developed countries (the service sectors are less energy-intensive than the manufacturing sectors); and much of the industrial sector's production is from inefficient Soviet-era facilities.

Emerging Economies

The emerging economies are expected to see the most rapid growth in industrial sector energy use worldwide over the projection period. Whereas mature market economies have shifted their industrial sector energy use from energy-intensive production (like steel and cement making) to service industries, the emerging economies still have fairly energy-intensive industrial sectors. Projections of industrial energy growth (although still relatively high) are lower than the recent historical rates for rapidly developing Asian countries like South Korea and China. Energy use for industrial sector purposes among the emerging economies is projected to grow by 3.9 percent per year from 2002 to 2015, before slowing to an average of 2.4 percent per year from 2015 to 2025 (Figure 26).

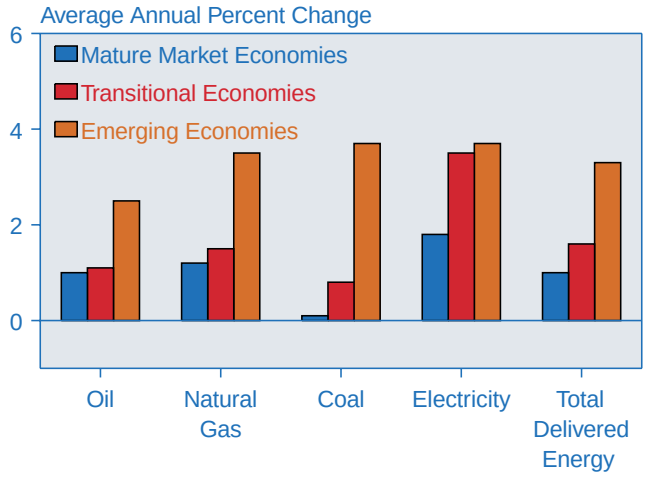
Natural gas and oil accounted for more than one-half of industrial energy consumption in 2002 in most regions of the world. China and India were exceptions to that generalization, and both countries use considerable amounts of coal (50 percent and 37 percent, respectively), mostly owing to their rich coal resources and lack of other domestic energy resources available for development.

Transportation Sector

Energy use in the transportation sector is dominated by petroleum product fuels. Barring any increase in the penetration of new technologies, such as hydrogen-fueled vehicles, the use of alternative fuels is expected to remain relatively modest through 2025. Thus, the *IEO2005* reference case projection of 2.1-percent average annual growth in the world's total energy use for transportation from 2002 to 2025 is paralleled by the forecast for transportation oil use (Table 3 and Figure 27).

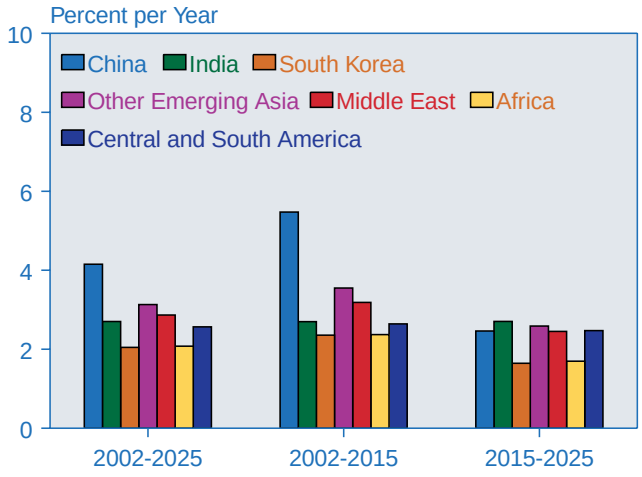
Energy use for the transportation sector is poised for its strongest growth in the Asian emerging economies. China is the key market that will lead regional consumption growth. India is also on a rapid growth path, and the region's mid-sized markets, such as Thailand and

Figure 25. Growth in Industrial Sector Delivered Energy Consumption by Region and Fuel, 2002-2025



Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **2025:** EIA, System for the Analysis of Global Energy Markets (2005).

Figure 26. Average Annual Growth Rates for Industrial Energy Consumption in Emerging Economies, 2002-2025



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Indonesia, also are projected to post strong growth. In China the number of cars has been growing by 20 percent per year, and the potential growth is almost unlimited. If the present patterns persist, China's car ownership would exceed the U.S. rate by 2030; however, large infrastructure barriers will have to be overcome for this to occur [*1*].

Mature Market Economies

In general, the transportation sector of the mature market economies is fully established, with extensive infrastructure that includes highways, airport facilities, and rail systems. Energy demand in the mature market economies is projected to grow at an average annual rate of 1.2 percent, from 53.2 quadrillion Btu in 2002 to 63.2 quadrillion Btu in 2015 and 69.9 quadrillion Btu in 2025.

In the United States, the transportation sector accounts for almost one-fourth of the country's total energy consumption; and in the *IEO2005* reference case, U.S. transportation energy demand is projected to grow from 26.9 quadrillion Btu in 2002 to 34.2 quadrillion Btu in 2015 and 39.4 quadrillion Btu in 2025. The United States is the largest user of transportation energy among the mature market economies and is projected to consume 56 percent of the region's total for the transportation sector in 2025.

Fuel economy for the U.S. light-duty vehicle stock is projected to improve by 5 percent over the forecast period. Strong macroeconomic and demographic factors are expected to increase the demand for larger, more powerful vehicles in the United States; however, advanced technologies and materials are expected to provide increased performance and size while improving new vehicle fuel economy. Fuel economy standards for cars are assumed to stay at current levels of 27.5 miles per gallon, and light truck standards are expected to increase from 20.7 miles per gallon in 2004 to 22.2 miles per gallon by 2007 [**2**]. For the stock of freight trucks, fuel economy is projected to increase from 6.0 miles per gallon in 2002 to 6.6 miles per gallon in 2025. A larger gain, 24.1 percent, is expected for aircraft.

In comparison to the United States, transportation energy demand in Western Europe is projected to expand more slowly, from 16.3 quadrillion Btu in 2002 to

Figure 27. Transportation Sector Energy Consumption by Region, 2002-2025

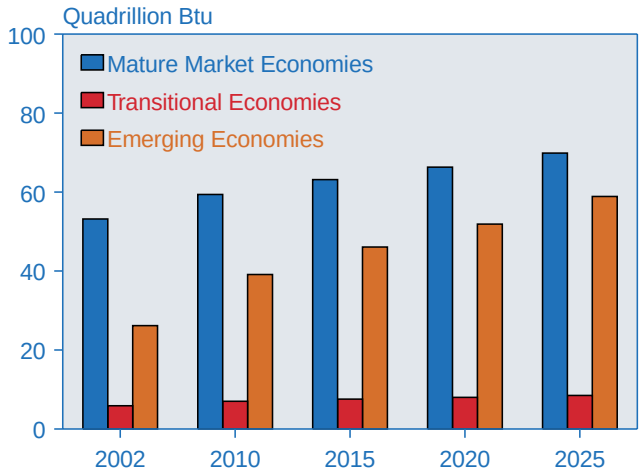

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Table 3. Transportation Energy Consumption and Total Oil Consumption by Region, 2002-2025
(Quadrillion Btu)

Region	2002	Projections				Average Annual Percent Change	
		2010	2015	2020	2025	2002-2015	2002-2025
Mature Market Economies							
Transportation Energy	53.2	59.4	63.2	66.3	69.9	1.3	1.2
Total Oil	88.8	96.4	101.3	105.5	110.3	1.0	0.9
Transitional Economies							
Transportation Energy	5.9	7.0	7.6	8.0	8.5	1.9	1.6
Total Oil	11.4	13.1	13.9	14.8	15.7	1.5	1.4
Emerging Economies							
Transportation Energy	26.2	39.1	46.1	51.9	58.9	4.4	3.6
Total Oil	59.2	83.6	95.5	106.3	117.4	3.7	3.0
Total World							
Transportation Energy	85.3	105.5	116.8	126.2	137.2	2.5	2.1
Total Oil	159.4	193.1	210.6	226.6	243.4	2.2	1.9

Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **Projections:** EIA, System for the Analysis of Global Energy Markets (2005).

17.3 quadrillion Btu in 2015 and 18.0 quadrillion Btu in 2025. The transportation sector's share of total energy use is projected to remain about the same over the forecast period, at 24 percent. Low population growth, high taxes on transportation fuels, and environmental policies are expected to slow the rate of energy demand growth in Western Europe to an average rate of 0.4 percent per year over the 2002 to 2025 time period.

Oil is projected to remain Western Europe's largest energy source for transportation, with demand increasing by 0.3 percent per year on average from 2002 to 2025. Transportation accounts for more than one-half of the increment in total oil use projected for the region, with the industrial sector accounting for the remainder. Declines in oil use are projected for the region's residential and commercial sectors. The fastest rate of growth in Western Europe's transportation fuel use is expected to occur in the aviation sector. Demand for diesel fuel is expected to increase more rapidly than demand for gasoline, because most countries in Western Europe are expected to keep taxes on diesel fuel lower than those for gasoline throughout the forecast period.

Transportation energy use in Japan is projected to grow at an average rate of 0.2 percent per year from 2002 to 2025, from 4.2 quadrillion Btu in 2002 to 4.4 quadrillion Btu in 2015 and remaining at that level through 2025, mainly because of Japan's aging population, projected low birth rate, and high taxes levied on motorists. Passenger cars in Japan are subject to nine taxes, imposed on acquisition, ownership, and operation. The taxes, aimed at reducing oil imports and securing government funds for infrastructure projects, such as road maintenance and construction, account for one-tenth of total government revenues.

Transitional Economies

Energy demand in the EE/FSU transportation sector as a whole is projected to grow at an average annual rate of 1.6 percent, from 5.9 quadrillion Btu in 2002 to 7.6 quadrillion Btu in 2015 and 8.5 quadrillion Btu in 2025. The growth in transportation energy use in this region is expected to be led by expanding ownership of private automobiles and an increasing role of trucking in freight transportation.

Emerging Economies

For the emerging economies as a whole, transportation sector energy consumption is projected to grow by 3.6 percent per year, from 26.2 quadrillion Btu in 2002 to 46.1 quadrillion Btu in 2015 and 58.9 quadrillion Btu in 2025—the highest rate of growth in transportation energy use worldwide. In 2002, the emerging economies accounted for about 31 percent of world energy use for transportation. In 2025, their share is projected to be 43 percent, as the gap between transportation energy consumption in the emerging economies and in the mature market economies narrows substantially over the forecast (Figure 27).

China's energy use for transportation is projected to grow by an average of 6.0 percent per year over the forecast, from 4.1 quadrillion Btu in 2002 to 10.4 quadrillion Btu in 2015 and 15.5 quadrillion Btu in 2025. Virtually all of the increase in transportation energy consumption is projected to be in the form of petroleum products. Road transport is expected to be the primary factor in China's growing demand for transportation fuels. There were 7.5 million automobiles and 6.4 million commercial vehicles in China in 2002 (as compared with 136.0 million automobiles and 89.4 million commercial vehicles in the United States) [*3*]. Personal travel in China has soared in the past two decades, with passenger miles traveled increasing fivefold [*4*]. Those trends are expected to continue over the projection period.

In India, energy demand in the transportation sector is projected to grow at an average rate of 4.7 percent a year, from 1.4 quadrillion Btu in 2002 to 3.1 quadrillion Btu in 2015 and 4.1 quadrillion Btu in 2025. The transportation sector's share of total energy use is expected to grow from 10 percent in 2002 to 14 percent in 2025. In comparison with other countries in the emerging Asia region, some of India's transportation infrastructure is well developed—especially the railways (although many rural areas still are largely inaccessible by rail). India has the most extensive railway system in the world, dating back to colonial times. An estimated 1.6 million people are employed by the country's railway system, making it the world's largest employer [*5*].

In South Korea, transportation energy demand is projected to grow by 1.9 percent per year, from 1.7 quadrillion Btu in 2002 to 2.3 quadrillion Btu in 2015 and 2.6 quadrillion Btu in 2025. South Korea's total demand for oil is projected to grow at an average annual rate of 1.3 percent, from 4.5 quadrillion Btu in 2002 to 6.1 quadrillion Btu in 2025—much slower than the average of 8.0 percent per year over the past three decades, reflecting the relative maturity of the South Korean transportation sector. Just over one-half of the country's projected increase in oil demand is expected in the transportation sector, with much of the remainder in the industrial sector.

Energy demand in the transportation sector in the other emerging nations of Asia (the largest of which are Thailand, Indonesia, Malaysia, Singapore, Taiwan, and Hong Kong) is projected to grow from 6.2 quadrillion Btu in 2002 to 10.1 quadrillion Btu in 2015 and 13.1 quadrillion Btu in 2025. The transportation share of total energy use in the region is projected to increase from 27 percent in 2002 to 29 percent in 2025, as national economies continue to mature and rising standards of living result in increased motor transport.

The Middle East region has a relatively small population and is not a major energy consumer but rather an exporter; however, rapid population growth is expected to result in more energy use for transportation in the future. The region's energy demand for transportation is projected to grow from 4.5 quadrillion Btu in 2002 to 6.8 quadrillion Btu in 2015 and 8.0 quadrillion Btu in 2025. Demand for transportation fuels in traditional exporting countries such as Saudi Arabia, Kuwait, Iraq, Oman, the United Arab Emirates, Yemen, and, most notably, Iran made the region a net importer of gasoline in 2003; however, that trend is expected to be reversed by 2010, when planned expansions of refinery capacity come on line.

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